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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/725,384	12/03/2003	Koyu Asai	67161-134	4977
7590 04/07/2005				
McDermott, Will & Emery 600 13th Street, N.W. Washington, DC 20005-3096				
		EXAMINER		
		ANDUJAR, LEONARDO		
		ART UNIT		PAPER NUMBER
		2826		

DATE MAILED: 04/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/725,384	ASAI ET AL.	
	Examiner	Art Unit	
	Leonardo Andújar	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 December 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>12/03</u> | 6) <input type="checkbox"/> Other: _____ |

Claim Rejections - 35 USC § 102

- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Regarding claim 1, Yamaha teaches (e.g. fig. 4) an interconnection structure (12, 13) of a semiconductor device 10 having an interconnection locally provided with a stress concentration portion 13 having tensile stress higher than that of another portion 13 of said interconnection generated therein (inherent). It is inherent that the dummy pattern 13 has a tensile stress higher than that of another portion 13 since the width is considerable greater than that of the other portion 13.

ISOLATED REGION
WHERE WIRING IS
NOT DENSE

RB

RA

DENSE REGION
WHERE WIRING
IS DENSE

15

18

14c

14b

14a

12

11

10

16

13

SOG

Detailed description: This cross-sectional diagram illustrates a semiconductor device with two distinct regions. The left side is labeled 'ISOLATED REGION WHERE WIRING IS NOT DENSE' and the right side is 'DENSE REGION WHERE WIRING IS DENSE'. A horizontal double-headed arrow indicates the transition between these regions, with 'RB' on the left and 'RA' on the right. The device structure consists of several layers: a base layer (10), a middle layer (11), and a top layer (12). In the isolated region, there is a small rectangular feature (13) and a larger one (16) labeled 'SOG'. In the dense region, there are multiple rectangular features (14a, 14b, 14c) and a larger one (15). A dashed line (18) is shown above the top layer (12).

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4. Regarding claim 6, Yamaha shows that the tensile stress is generated by a layer 14 made of silicon oxide and having a thickness of 200 micrometers (col. 6/lls. 6-24). This is an inherent property of a silicon oxide layer having a thickness of 200 micrometers.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaha et al. (US 5,998,814) in view of Sumino et al. (US 6,414,393).

7. Regarding claim 2, Yamaha teaches most aspects of the instant invention including an interconnection provided with a dummy interconnection 13 wherein the dummy interconnection is provided with said stress concentration portion but the dummy interconnection is not connected to an interconnection body. Nevertheless, Sumino (e.g. fig. 6) teaches dummy interconnection 3a that are connected to an interconnection body 62. With this structure, it is possible to prevent the solid portion 3a and the linear portion 3b, which constitute the dummy pattern 3, from being electrically isolated and turning into a floating state, and to thereby keep the potential of the dummy pattern 3 stable. As a result, it is possible to avoid the occurrence of wiring delay based on the unstable potential of the dummy pattern 3 (col. 6/lls. 1-16). It would have been obvious to one of ordinary skill in the art at the time the invention was made to connect

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the dummy interconnection disclosed by Yamaha to an interconnection body in order to keep the potential of the dummy pattern stable in order to avoid the occurrence of wiring delay based on the unstable potential of the dummy pattern as taught by Sumino.

8. Regarding claim 3, Sumino disclose that the dummy pattern include a via 61.

9. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaha et al. (US 5,998,814) in view of Sumino et al. (US 6,414,393) further in view of Iku (JP-07106323 cited by applicant).

10. Regarding claims 4, Yamaha in view of Sumino shows most aspects of the instant invention. Yamaha in view of Sumino does not explicitly teach that the tensile stress is generated in the stress concentration portion by providing an insulating film having internal stress of compression, in proximity to said stress concentration portion or in contact with said stress concentration portion. Nevertheless, Iku teaches a interconnection having a tensile stress generated in the stress concentration portion by providing an insulating film 4A/5A having internal stress of compression and in contact with said stress concentration portion 3a. According to Iku this type of embodiment improves stress migration withstanding of the wiring (abstract). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide an insulating film having internal stress of compression, in contact with the stress concentration portion disclosed by Yamaha in view of Sumino in order to improve stress migration withstanding of wiring as taught by Iku.

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11. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaha et al. (US 5,998,814) in view of Sumino et al. (US 6,414,393) further in view of Iku (JP-07106323 cited by applicant) further in view of Yamazaki (US 5,815,226).

12. Regarding claim 5, Yamaha in view of Sumino further in view of Iku shows most aspect of the instant including a silicon oxide insulating film made by CVD (Yamaha col.6/lls. 6-24). Yamaha in view of Sumino further in view of Iku does not teach that silicon nitride is a suitable material for making an insulating film by CVD. Nevertheless, Yamazaki teaches that silicon nitride, silicon oxide and silicon oxynitride are suitable materials for making insulating layers by CVD (col. 4/lls. 42-50). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use SiN instead of silicon oxide/silicon oxynitride in the invention disclosed by Yamaha in view of Sumino further in view of Iku, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

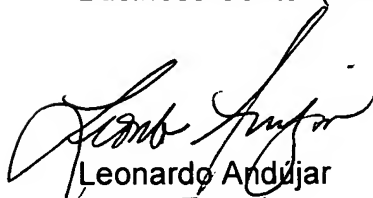
Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leonardo Andújar whose telephone number is 571-272-1912. The examiner can normally be reached on Mon through Thu from 9:00 AM to 7:30 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J. Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Leonardo Andujar
Patent Examiner
Art Unit 2826
03/28/2005